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(54) CUPS FOR HOLDING INGREDIENTS FOR DRINKS

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No. OF CLAIMS 1

CUPS FOR HOLDING INGREDIENTS FOR DRINKS

A B S T R A C T

A double-walled container consisting of an inner member secured within an outer member, each member being of seamless thin-wall plastics material and each member comprising a side wall and a bottom wall; the container including an upper sealing surface adjacent to the inner bottom wall and a lower sealing surface adjacent to the outer bottom wall, so placed that the respective sealing surfaces abut each other and make a seal when two such containers are nested, and thus isolate a space between the inner bottom wall of the lower of the nested containers and the outer bottom wall of the upper of the nested containers; a downwardly-facing holding surface on the interior of the inner side wall and an upwardly-facing holding surface on the exterior of the outer side wall, both above the mid-height of the side walls, and so placed that, when two such containers are nested, the respective holding surfaces overlap each other and thus hold the respective sealing surfaces together, and at the same time make a second seal; at least one of the holding surfaces being capable of resilient radial displacement in response to substantial axial forces on the containers, thus permitting intentional assembly and separation of the containers.

There is a need for seamless thin-wall containers of plastics material, capable of nesting with an identical container, the container comprising a bottom wall, and a side wall extending generally upwards and outwards from the bottom wall, there being means serving to maintain and isolate a space between the bottom walls of the containers when the containers are nested.

When a stack of such containers is assembled, each space can be pre-loaded, e.g. with a freeze-dried drink concentrate.

According to this invention, such a container is double-walled and is capable of nesting and interlocking with another identically formed container with a space for storage of a concentrate between the bottom walls of the containers when nested and interlocked. The double-walled container comprises an inner member secured within an outer member with each member being formed of a seamless thin-walled plastics-material and with each member comprising a bottom wall and an integral side wall extending generally upwardly and outwardly to the upper end thereof. The inner member includes an upper sealing surface spaced from the bottom wall thereof a distance sufficient to provide a space therebelow for storage of a concentrate, and the outer member includes a lower sealing surface at the junction of the bottom wall and side wall of the outer member, with the upper and lower sealing surfaces being inclined to the axis of the container in a direction upwardly and outwardly of the container in a frusto-conical shape and co-operating to make a seal when two such containers are nested. A downwardly facing holding surface is formed on the inner member, and an upwardly facing holding surface is formed in the outer member,

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with the downwardly and upwardly facing holding surfaces formed in the side walls of the inner and outer members above the midheight of the container and with the vertical distance between the downwardly facing holding surface and the upwardly facing sealing surface of the inner member being sufficiently less than the distance between the upwardly facing holding surface and the lower sealing surface of the outer member to produce axial and hoop stresses in the side wall of an inner member between the holding and sealing surfaces thereof of one container and in the side wall of the outer member between the holding and sealing surfaces thereof of another of the containers when nested in the one container, and with said holding surfaces overlapping each other to interlock the another and the one containers.

The invention will be explained in more detail with reference to an example shown in the accompanying drawings, in which:-

Figure 1 is a fragmentary vertical section of one cup; and

Figure 2 is a similar section of two cups nested.

The cup shown in the drawings consists of an inner member 2 and an outer member 4, each made of polystyrene, by plug-assist thermo-forming from sheet material. This process of manufacture aims to produce an approximately uniform thickness of 0.010 inch in each member. The size of the cup is 3 inch overall height, and 2.875 inch overall diameter at the top. The cup is designed so that, in a stack of cups, each one is 0.5 inch above the one below; this dimension is known as the stacking height.

Note that, in the drawings, all the thicknesses of material are exaggerated. Because of this, the upper cup in Figure 2 has to be shown somewhat to the left of the lower cup. In practice,

the upper cup would be directly above the lower cup, i.e. with the central vertical axis of the upper cup coinciding with that of the lower cup.

The inner member has a bottom wall 6, and a side wall which extends generally upwards and outwards from a junction 8 with the bottom wall to a beaded rim 10 defining an open top of the cup. The outer member 4 has a bottom wall 12 and a side wall which extends generally upwards and outwards to a beaded rim 14 which, after the inner member has been placed in position within the outer member, is enclosed by the rim 10, so that the two members are held together.

At the junction between the bottom wall 12 and the side wall of the outer member, there is a lower sealing surface 16. At a distance above this corresponding to the stacking height, there is an upper sealing surface 18, forming part of the side wall of the inner member. When two cups are fully nested together, the sealing members engage one another as shown in Figure 2. Each of the sealing surfaces is conical, with a semi-vertical angle of 30°.

The middle part of the height of the side wall of the outer member takes the form of a series of steps, which constitute a finger-gripping portion 20.

Above this finger-gripping portion, the cup is formed with four rings, namely a first and second ring 22 and 24 on the inner member, and a third and fourth ring 26, and 28 on the outer member. In cross section, these are V-shaped, with the apex directed inwards, except that the lowermost ring 28 has no lower wall. When the cups are fully nested, as shown in Figure 2, the first ring 22 of the lower cup interengages with the third ring 26 of the upper cup. The inner surface of the lower wall of the first ring constitutes an internal downwardly-facing upper

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holding surface. The outer surface of the lower wall of the third ring 26 constitutes an external upwardly-facing lower holding surface. These surfaces overlap each other when the cups are nested, and thus hold the cups together. The vertical distance from the first ring 22 to the operative part of the upper sealing surface 18 is slightly less than the vertical distance from the third ring 26 to the operative part of the lower sealing surface 16. Consequently, when the cups are moved into one another, into nested relation, the upper and lower sealing surfaces 18 and 16 make contact a little before the first ring 22 reaches engagement with the third ring 26 of the upper cup. The result of this is that axial and hoop stresses are set up in the side walls, which have the effect of holding the sealing surfaces 18 and 16 firmly in contact with each other, and possibly causing slight circumferential engagement of the upper surface 18 and circumferential contraction of the lower surface 16. However, the angle of the conical surfaces is such that, when subsequent separation is desired, no jamming has occurred between the sealing surfaces 18 and 16.

In the nested condition, the first ring 22 of the lower cup and the third ring 26 of the upper cup are in a slightly displaced and consequently stressed condition, having moved radially outwards and inwards respectively, from the as-moulded condition.

The rings 22 and 26 are capable of further resilient radial

displacement in response to substantial axial forces on the cups, thus permitting the internal apex of the ring 22 to pass the exterior 30 of a cylindrical portion of cup above the ring 26. As shown in Figure 2, the fourth ring 28 of the upper cup is in a position to cooperate with the second ring 24 of the lower cup to resist excessive movement of one cup into the other in this way, which might lead to overriding of the sealing surfaces 18 and 16.

In the nested condition, the holding surfaces of the rings 22 and 26 make a second seal by their contact with each other.

If, as the cups are nested together, air becomes trapped between the side walls, with consequent rise of pressure, this pressure can escape by leakage between the rings 22 and 26. To permit this leakage, the crest of the first ring 22 is flattened at spaced parts around the cup. These flats enable the first ring 22 to flex into a non-circular shape, and this permits the leakage, and ensures that the third ring of the cup is not overloaded, which might cause it to assume a lobed shape. The number of flats is preferably eight.

Between the rings 22 and 24 is a cylindrical portion 32. This, as moulded, has an internal diameter substantially the same as the external diameter of the cylindrical portion 34, between the rings 26 and 28. When two cups are in nested condition, the displacement of the first and third rings causes displacement of the cylindrical portions 32, 34, so that they do not interengage.

After initial manufacture, and before the space 36 between the bottoms of nested cups has been pre-loaded, the cups may be lightly nested together at a greater vertical spacing, with the fourth ring 28 of the upper cup resting on top of the first ring 22 of the lower cup. The cups can then readily be separated for pre-loading, and then nested in the position shown in Figure 2.

The semi-vertical angle of the sealing surfaces 8 and 10 need not be 30° as in this example. In particular, it may be less than 30°, the choice depending on the ease of separation desired.

Over the majority of their height, there is a slight air gap between the side walls of the inner and outer members of the cup. Likewise there is a slight air gap between the bottom walls of the inner and outer members. As already mentioned, the members are secured together at the rims 10, 14. In addition, the members may interengage locally elsewhere, for transference of the weight of contents of the cup from the inner member to the outer member.

In the example shown, the side wall of the inner member has a simple conical shape at the level of the finger-gripping portion 20 of the outer member. Alternatively, the inner member may have steps matching those in the portion 20.

In the example shown, the inner and outer members are of the same material. Alternatively, the members may be of

different materials. This enables the members to be of different hardnesses, so that, for example, a harder outer member seals against a somewhat softer inner member. This may enhance the effectiveness of the seal.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A double-walled container capable of nesting and interlocking with another identically formed container with a space for storage of a concentrate between the bottom walls of the containers when nested and interlocked, said double-walled container comprising an inner member secured within an outer member, each member being formed of a seamless thin-walled plastics-material and each member comprising a bottom wall and an integral side wall extending generally upwardly and outwardly to the upper end thereof, the inner member including an upper sealing surface spaced from the bottom wall thereof a distance sufficient to provide a space therebelow for storage of a concentrate, the outer member including a lower sealing surface at the junction of the bottom wall and side wall of said outer member, said upper and lower sealing surfaces being inclined to the axis of said container in a direction upwardly and outwardly of said container in a frusto-conical shape and cooperating to make a seal when two such containers are nested, a downwardly facing holding surface formed on said inner member, an upwardly facing holding surface formed in said outer member, said downwardly and upwardly facing holding surfaces formed in the side walls of said inner and outer members above the midheight of said container and with the vertical distance between said downwardly facing holding surface and said upwardly facing sealing surface of said inner member being sufficiently less than the distance

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between said upwardly facing holding surface and said lower sealing surface of said outer member to produce axial and hoop stresses in the side wall of an inner member between the holding and sealing surfaces thereof of one container and in the side wall of the outer member between the holding and sealing surfaces thereof of another of said containers when nested in said one container with said holding surfaces overlapping each other to interlock said another and said one containers.

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Fig. 1.

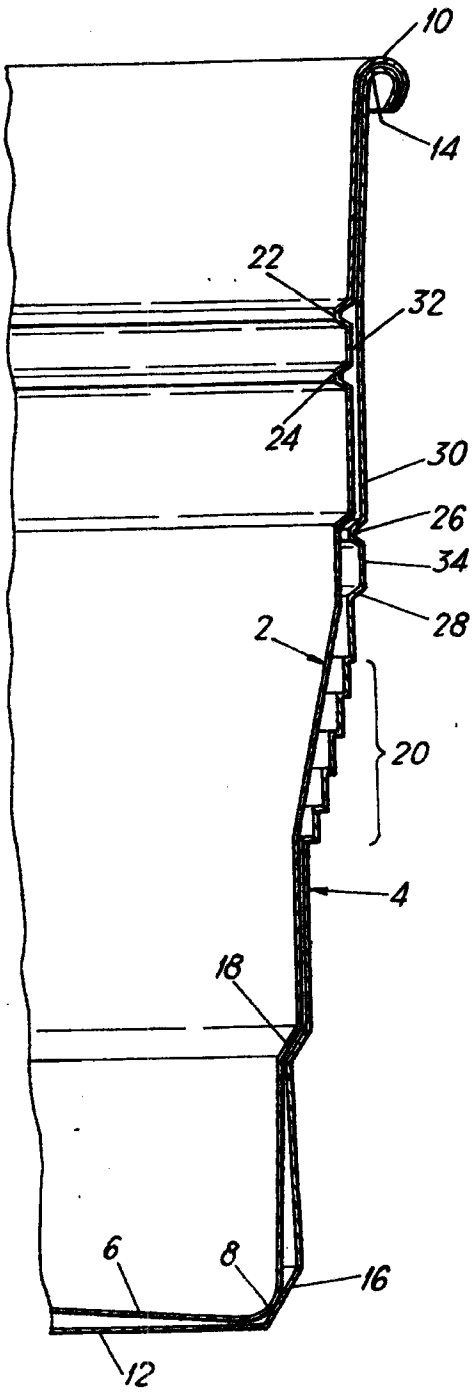

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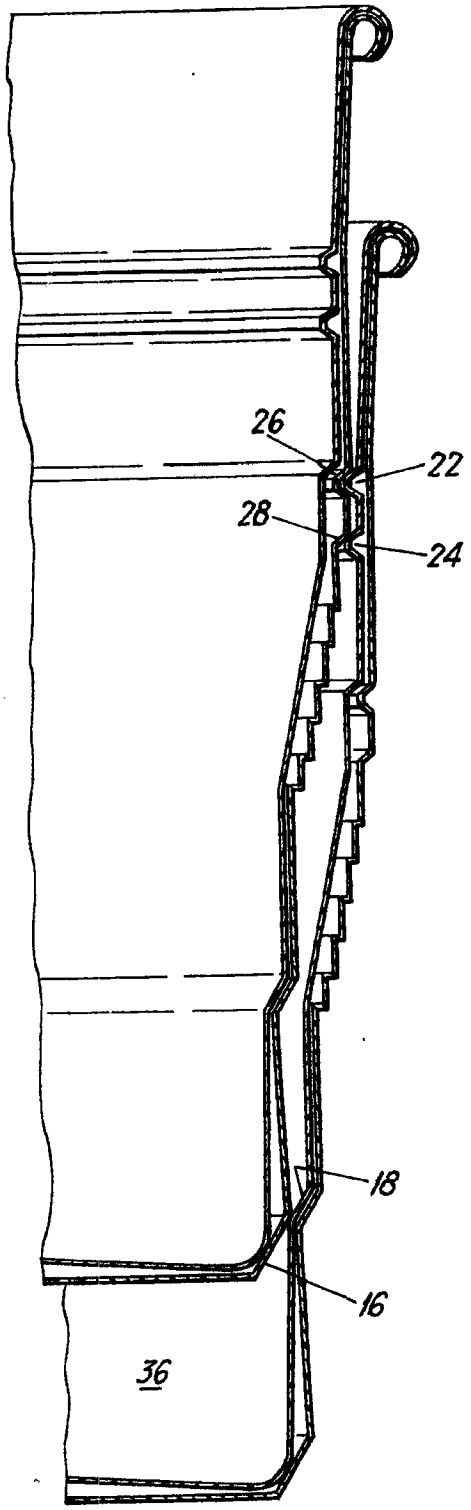
Fig. 2.



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